

**FISHERY RESEARCH BULLETIN 89-03**

---

**The Development of Salmon, Herring, and Crab  
Commercial Fisheries in the Arctic-Yukon-Kuskokwim  
Region of Alaska, 1961-1988**

by

**Lawrence S. Buklis**



Alaska Department of Fish and Game  
Division of Commercial Fisheries  
PO Box 3-2000  
Juneau, Alaska 99802

July 1989

---

**State of Alaska**

**Steve Cowper, Governor**

The Fishery Research Bulletin Series was established in 1987, replacing the Informational Leaflet Series. This new series represents a change in name rather than substance. The series continues to be comprised of divisional publications in which completed studies or data sets have been compiled, analyzed, and interpreted consistent with current scientific standards and methodologies. While most reports in the series are highly technical and intended for use primarily by fishery professionals and technically oriented fishing industry representatives, some nontechnical or generalized reports of special importance and application may be included. Most data presented are final. Publications in this series have received several editorial reviews and usually two *blind* peer reviews refereed by the division's editor and have been determined to be consistent with the division's publication policies and standards.

THE DEVELOPMENT OF SALMON, HERRING, AND CRAB  
COMMERCIAL FISHERIES IN THE ARCTIC-YUKON-KUSKOKWIM REGION  
OF ALASKA, 1961-1988

By  
Lawrence S. Buklis

Fishery Research Bulletin No. 89-03

Alaska Department of Fish and Game  
Division of Commercial Fisheries  
Juneau, Alaska

July 1989

## **AUTHOR**

Lawrence S. Buklis is Region III Regional Research Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, 333 Raspberry Road, Anchorage, AK 99518.

## **ACKNOWLEDGMENTS**

Helpful review for data accuracy and text clarity was provided by Rich Randall, Rich Cannon, Bob Conrad, Kim Francisco, Craig Whitmore, Fred Andersen, and Charlie Lean, all of Region III of the Division of Commercial Fisheries. Bob Wilbur, editor for the Division of Commercial Fisheries, facilitated final review and publication.

## TABLE OF CONTENTS

|   | <u>Page</u> |
|---|-------------|
| LIST OF TABLES . . . . .                            | iv          |
| LIST OF FIGURES . . . . .                           | v           |
| ABSTRACT . . . . .                                  | vi          |
| INTRODUCTION . . . . .                              | 1           |
| METHODS . . . . .                                   | 2           |
| Data Sources . . . . .                              | 2           |
| Definition of Effort, Value, and Averages . . . . . | 2           |
| Salmon Roe Sales . . . . .                          | 3           |
| RESULTS . . . . .                                   | 4           |
| Salmon . . . . .                                    | 4           |
| Chum Salmon . . . . .                               | 4           |
| Chinook Salmon . . . . .                            | 5           |
| Coho Salmon . . . . .                               | 5           |
| Sockeye Salmon . . . . .                            | 5           |
| Pink Salmon . . . . .                               | 5           |
| Herring . . . . .                                   | 5           |
| Crab . . . . .                                      | 6           |
| Regional Summary . . . . .                          | 6           |
| DISCUSSION . . . . .                                | 7           |
| LITERATURE CITED . . . . .                          | 9           |

## LIST OF TABLES

| <u>Table</u>  | <u>Page</u> |
|---|-------------|
| 1. Salmon commercial effort and ex-vessel value in the Arctic-Yukon-Kuskokwim Region, 1961-88 . . . . .   | 13          |
| 2. Chum salmon commercial harvest and ex-vessel value in the Arctic-Yukon-Kuskokwim Region, 1961-88. Harvest is in thousands of fish, or thousands of lb of roe. Value is the price paid to fishermen in thousands of dollars . . . . . | 14          |
| 3. Chinook salmon commercial harvest and ex-vessel value in the Arctic-Yukon-Kuskokwim Region, 1961-88. Harvest is in thousands of fish. Value is the price paid to fishermen in thousands of dollars . . . . .                         | 15          |
| 4. Coho salmon commercial harvest and ex-vessel value in the Arctic-Yukon-Kuskokwim Region, 1961-88. Harvest is in thousands of fish. Value is the price paid to fishermen in thousands of dollars . . . . .                            | 16          |
| 5. Sockeye salmon commercial harvest and ex-vessel value in the Arctic-Yukon-Kuskokwim Region, 1961-88. Harvest is in thousands of fish. Value is the price paid to fishermen in thousands of dollars . . . . .                         | 17          |
| 6. Pink salmon commercial harvest and ex-vessel value in the Arctic-Yukon-Kuskokwim Region, 1961-88. Harvest is in thousands of fish. Value is the price paid to fishermen in thousands of dollars . . . . .                            | 18          |
| 7. Herring commercial harvest, effort, and ex-vessel value in the Arctic-Yukon-Kuskokwim Region, 1979-88 . . . . .  | 19          |
| 8. Red king crab summer commercial harvest, effort, and ex-vessel value in the Arctic-Yukon-Kuskokwim Region, 1977-88 . . . . .   | 20          |
| 9. Ranking of salmon, herring, and crab commercial fisheries in the Arctic-Yukon-Kuskokwim Region based upon average annual ex-vessel value for the period 1984-88 . . . . .  | 21          |

## LIST OF FIGURES

| <u>Figure</u>   | <u>Page</u> |
|---|-------------|
| 1. Map of the Arctic-Yukon-Kuskokwim Region . . . . .   | 22          |
| 2. Salmon commercial effort (top) and ex-vessel value (bottom) by area in the Arctic-Yukon-Kuskokwim Region, 1961-88 . . . . .  | 23          |
| 3. Salmon commercial harvest (top) and ex-vessel value (bottom) by species in the Arctic-Yukon-Kuskokwim Region, 1961-88. Note that roe harvest in lb is included with numbers of chum salmon, and that pink salmon are too few to appear graphically . . . . . | 24          |
| 4. Chum salmon (top), chinook salmon (middle), and coho salmon (bottom) commercial harvest by area in the Arctic-Yukon-Kuskokwim Region, 1961-88. Note that roe harvest in lb is included with numbers of chum salmon . . . . .                                 | 25          |
| 5. Herring commercial harvest (top), effort (middle), and ex-vessel value (bottom) by area in the Arctic-Yukon-Kuskokwim Region, 1979-88 . . . . .  | 26          |
| 6. Red king crab summer commercial harvest (top), effort (middle), and ex-vessel value (bottom) in the Norton Sound Area of the Arctic-Yukon-Kuskokwim Region, 1977-88 . . . . .  | 27          |
| 7. Contribution by area (top) and species (bottom) to the \$21.4 million average annual ex-vessel value of commercial fisheries for the 1984-88 period in the Arctic-Yukon-Kuskokwim Region . . . . .   | 28          |
| 8. Ex-vessel value in actual dollars and inflation-adjusted dollars (using the Anchorage Consumer Price Index relative to 1961) for salmon, herring, and red king crab commercial fisheries combined in the Arctic-Yukon-Kuskokwim Region, 1961-88 . . . . .    | 29          |

## ABSTRACT

Documentation of the development of commercial fisheries in the Arctic-Yukon-Kuskokwim Region, which accounts for over 70% of the land area of the state of Alaska, can be helpful when responding to information requests from other agencies and the public. Harvest, effort, and ex-vessel value for salmon (*Oncorhynchus* spp), herring (*Clupea harengus pallasii*), and summer red king crab (*Paralithodes camtschatica*) commercial fisheries have previously been reported by area and species but have not been presented for combined areas and species. Annual ex-vessel value for all commercial fisheries in the region combined increased by a factor of 36 from an average of \$0.6 million in 1961-65 to an average of \$21.4 million in 1984-88. Even when these figures are adjusted for inflation based on the Anchorage Consumer Price Index the average annual ex-vessel value increased by a factor of nearly 12 between these two periods. While subsistence use of these resources is extensive and long-standing, the commercial fisheries have developed to a significant size only in the last 10 to 15 years. The growth and diversification of these fisheries since the late 1970's is apparent by comparison of the harvest in 1976 with that of 1988. In 1976, 1.6 million salmon were harvested with an ex-vessel value of \$4.4 million. In 1988, 4.4 million salmon, 260 thousand lb of salmon roe, 7.8 thousand tons of herring, and 237 thousand lb of red king crab were harvested having a record ex-vessel value of \$36.3 million. Value increased by a factor of eight in 12 years. Even when these figures are adjusted for inflation the ex-vessel value increased by a factor of nearly five in 12 years.

KEY WORDS: Commercial fisheries, harvest, effort, ex-vessel value, Arctic-Yukon-Kuskokwim Region, salmon, herring, red king crab



## INTRODUCTION

The Arctic-Yukon-Kuskokwim (AYK) Region encompasses over 70% of the land area of the state of Alaska (Figure 1) and is equivalent in size to the combined land areas of the states of Washington, Oregon, Idaho, and California. The region extends north from the Alaska Range and the Bristol Bay drainage, and includes all of the drainages of the Bering Sea and Arctic Ocean from Cape Newenham in the south to Demarcation Point at the Canadian border. Also known as Region III within the Division of Commercial Fisheries of the Alaska Department of Fish and Game (ADF&G), the region is subdivided into the Kuskokwim, Yukon, Norton Sound, and Kotzebue Areas for fisheries management purposes. Harvest, effort, and ex-vessel value information for salmon (*Oncorhynchus* spp), herring (*Clupea harengus pallasii*), and red king crab (*Paralithodes camtschatica*) commercial fisheries has previously been reported by area and species (Francisco et al. 1988a; Merkouris and Lean 1988; Whitmore et al. 1988a) but has not been presented for combined areas and species.

Subsistence use of the fisheries resources within the AYK Region is extensive and long-standing (ADF&G 1972; Pete and Kreher 1986; Bergstrom and Gnath 1988). In contrast, the commercial fisheries have developed to a significant size only within the past 10 to 15 years. The majority of the fishermen participating in these commercial fisheries are local residents with small-scale operations. As a result these commercial fisheries are largely a source of cash used to supplement a rural subsistence lifestyle.

The purpose of this report is to provide a concise and uniform presentation of salmon, herring, and red king crab commercial fisheries statistics for the AYK Region from 1961 through 1988. This information will be summarized by species for all areas and by area for all species to provide an overview of the development and current ex-vessel value of commercial fisheries within the region. Agency planning may benefit by relating fisheries research and management efforts within the region to the development of the commercial fisheries.

No attempt was made to include escapement, subsistence, personal use, and sport harvest information, or to include small-scale freshwater commercial fisheries which have occurred on an irregular basis. The omission of this companion information is not intended to diminish its significance, but rather to focus on the primary commercial fisheries.

Commercial fisheries harvest, effort, and ex-vessel values presented in this report were obtained primarily from annual management reports prepared by division staff from the areas which comprise the region. With a few exceptions, commercial fisheries were small and undeveloped in the region prior to 1961, and information is incomplete. This report is therefore limited to data beginning with the 1961 season.

## METHODS

### *Data Sources*

All data for 1988 were preliminary and were obtained from reports to the Alaska Board of Fisheries for the 1988 season (Hamner 1988; Francisco et al. 1988b; Whitmore et al. 1988b; and Lean and Merkouris 1988a, 1988b, 1989). Salmon, herring, and red king crab commercial harvest, effort, and ex-vessel value data through 1987 were obtained from the 1987 annual management report for each area (Francisco et al. 1988a; Whitmore et al. 1988a; and Merkouris and Lean 1988), except as otherwise cited.

Salmon commercial effort data for the 1961-74 period were obtained from the 1974 annual management report for the AYK Region (Regnart et al. 1974), while data for the 1975-77 period were obtained from the 1977 annual management report for each area (Jonrowe et al. 1977; Geiger and Andersen 1977; and Kuhlmann 1977). In addition, salmon commercial effort data for the 1978-83 period for the Kuskokwim Area were obtained from the annual management report for each year from that area (Jonrowe et al. 1978, 1979, 1980, 1982, 1983, 1984).

Salmon ex-vessel value data for the Kuskokwim Area for the 1961-75 period were obtained from the 1975 annual management report for that area (Kuhlmann et al. 1975).

Herring commercial harvest, effort, and ex-vessel value data for 1979 and 1980 were obtained from a report to the Alaska Board of Fisheries for the 1981 season (Fried et al. 1981).

The Anchorage Consumer Price Index (CPI) for each year from 1961 to 1988 was obtained from Alaska Department of Labor statistics (J.K. Hallanger, Alaska Department of Labor, Anchorage, personal communication).

### *Definition of Effort, Value, and Averages*

Effort was defined somewhat differently for the various fisheries described in this report and was based upon the format of the available historical information. Effort for all salmon fisheries from 1961 through 1977 was based on the number of vessel licenses issued. With one exception, effort for all salmon fisheries from 1978 through 1988 was based on the number of Commercial Fisheries Entry Commission (CFEC) permit card holders making at least one delivery. The exception was that for the Kuskokwim Area from 1978 through 1983, effort was based on the number of CFEC permits issued each year. Since not all vessel or CFEC permit holders made at least one delivery in a given year, effort estimates through 1977, and for the Kuskokwim Area through 1983, were somewhat inflated relative to the more recent estimates. Effort for all herring and crab fisheries was defined as the number of fishermen making at least one delivery.

Value was the ex-vessel dollar value of the harvest, which was the total number of dollars paid to the fishermen. This was derived from department copies of sales receipts and did not include post-season adjustments provided by contracts

or special incentive payments from buyers. No attempt was made to adjust for inflation in the results section of this report. Therefore, the ex-vessel value of the 1961 harvest was stated in 1961 dollars while the ex-vessel value of the 1988 harvest was stated in 1988 dollars. However, the Anchorage CPI was used to adjust commercial fishery ex-vessel values for inflation in the discussion section.

Some of the historical salmon fishery ex-vessel values were not previously reported by species. In those cases the most appropriate average weight and average price per pound data were used to estimate ex-vessel value by species. Species which occur only infrequently in the commercial harvest for a given area were not presented in this report. These include sockeye and pink salmon for the Yukon Area, sockeye salmon for the Norton Sound Area, and chinook, coho, sockeye, and pink salmon for the Kotzebue Area. These two factors, namely estimation of ex-vessel value by species and the exclusion of minor species, resulted in small differences between salmon fishery ex-vessel values presented in this report and ex-vessel values as presented in individual area fishery reports. These differences were generally less than one percent.

Averages were for 5-year periods with the period 1984 through 1988 being the most recent. Admittedly, 5-year periods may not have been the most appropriate for some species having alternate-year cycles of abundance. This shortcoming was outweighed by the need for a standardized reporting format so that summaries across areas and species could be accomplished. Use of averages also reduced the effect of unusually large or small harvests in any given year.

### *Salmon Roe Sales*

Salmon are generally sold in the round in the AYK Region commercial fisheries. In the course of processing, roe is extracted by the buyer and marketed separately from the fish carcass. However, in recent years summer run chum salmon (*O. keta*) have been harvested primarily for the roe market in portions of the upper Yukon River. In this fishery roe has been extracted and delivered to buyers by commercial fishermen who retain carcasses for subsistence purposes. Therefore, a description of chum salmon commercial harvests in the AYK Region necessarily includes both numbers of fish in the round and pounds of roe delivered to the buyers. Sales of roe from fish captured for subsistence purposes, which was legal from 1974 through 1977, were not included in this report. No attempt was made to estimate the number of female fish required to produce the reported roe sales, or the incidental catch of males in the roe directed fishery.

It should be emphasized that roe sales occurred only in the upper portion of the Yukon River drainage, and were primarily from summer run chum salmon. Summer run chum salmon enter the Yukon River from late May to mid-July and spawn widely throughout the Alaska portion of the drainage, while the fall run enters from mid-July to early September and spawns primarily in the upper portions of the drainage in Alaska and Canada.

## RESULTS

### *Salmon*

Salmon were harvested with set and drift gill nets throughout the region, and also with fish wheels in the upper portion of the Yukon River drainage. Commercial salmon fisheries grew substantially in the AYK Region from 1961 to 1988 (Table 1). Effort increased from fewer than 1,200 fishermen per year in the 1960's to a peak of 2,350 in 1975. With the implementation of limited entry in 1976, effort stabilized at approximately 2,000 participants annually. Growth in the value of the harvest has been even more significant. Value for all commercial salmon fisheries throughout the region was less than \$0.6 million per year in the early 1960's, but has consistently exceeded \$11.0 million per year throughout the 1980's. The record value of \$29.2 million in 1988 was 50x greater than the values of the early 1960's. The majority of the growth in value occurred in the Yukon and Kuskokwim Areas, while the Norton Sound and Kotzebue Areas were relatively more stable (Figure 2).

Annual harvests have increased from < 0.7 million fish during the 1960's to > 2.0 million fish and 100 thousand lb of roe during the 1980's. A record of 4.4 million fish and 260 thousand lb of roe was harvested in 1988, nearly 7x greater than the level of the early 1960's. Development of chum and coho salmon (*O. kisutch*) fisheries accounted for the majority of the growth in numbers of fish harvested; chinook salmon (*O. tshawytscha*) harvests have been longer established and relatively more stable (Figure 3). Apparent growth in sockeye salmon (*O. nerka*) harvests, virtually all of which occurs in the Kuskokwim Area, may be due to misidentification of this species as chum salmon prior to 1981. While the value of the harvest has increased for all species, growth was greatest for chum and coho salmon. The value of the coho salmon harvest in 1988 nearly equaled that for chinook salmon.

### Chum Salmon

Chum salmon are the most numerous salmon throughout the region. Commercial fisheries for chum salmon have largely developed since the 1970's. Annual harvests during the 1960's were generally below 0.25 million fish, while a record of 3.2 million fish were harvested throughout the region in 1988 (Table 2). A roe fishery, primarily for summer run chum salmon, developed in the upper portion of the Yukon River drainage since 1979. Roe sales grew from 36 thousand lb in 1979 to a record 272 thousand lb in 1986. During the past 15 years, annual value of the chum salmon harvest for the entire region (fish and roe combined) has increased from \$3.7 million (1974-78 average) to \$6.3 million (1984-88 average).

During the early 1960's the Norton Sound Area accounted for the majority of the chum salmon harvest in the AYK Region (Figure 4). Since that time, harvests remained relatively stable in Norton Sound but increased significantly in the rest of the region. The Yukon Area now supports the largest chum salmon fishery in the region. Kotzebue Area harvests have typically been second in magnitude, followed closely by the Kuskokwim Area, although in recent years this relationship has been reversed.

## Chinook Salmon

Chinook salmon have supported commercial fisheries in the Yukon and Kuskokwim Areas, and to a lesser extent in the Norton Sound Area. As some of the oldest commercial fisheries in the region, they were established well before 1961. Typical of a more mature fishery, harvests have fluctuated more narrowly than for some of the other salmon species (Figure 4). Annual harvests for the entire region were between 115 and 160 thousand through the mid-1970's, reached a low of 94 thousand in 1975, and then increased to a high of 252 thousand in 1983 (Table 3). During the past 15 years, annual value of the chinook salmon harvest has increased from \$2.0 million (1974-78 average) to \$5.7 million (1984-88 average).

## Coho Salmon

Most of the commercial coho salmon harvest in the AYK Region has occurred in the Kuskokwim Area, with the Yukon and Norton Sound Areas contributing much smaller harvests (Figure 4). Similar to chum salmon, commercial fisheries for coho salmon have developed only recently. Annual harvests during the early 1960's were below 0.1 million fish. A record of nearly 1.0 million coho salmon were harvested in 1984 (Table 4). During the past 15 years, annual value of the coho salmon harvest has increased from \$0.7 million (1974-78 average) to \$3.6 million (1984-88 average).

## Sockeye Salmon

Virtually all of the commercial sockeye salmon harvest in the AYK Region has occurred in the Kuskokwim Area. Prior to 1981 most fishermen did not differentiate sockeye from chum salmon, making historical harvest and value data very inaccurate. Since 1981 the value of the harvest has ranged from \$0.3 million in 1984 to \$1.7 million in 1987 (Table 5). Annual value for the 1984-88 period averaged \$0.9 million.

## Pink Salmon

Pink salmon (*O. gorbuscha*) are more abundant in even-numbered years in the AYK Region. They are commercially harvested in significant numbers only within the Norton Sound and Kuskokwim Areas. Even within these areas, pink salmon make only a minor contribution to the total number or value of salmon harvested. Furthermore, that contribution has been declining, while fisheries for other species have been stable or growing. Pink salmon harvests for these two areas combined averaged 161 thousand fish annually for the 1974-78 period, but only 64 thousand fish for the 1984-88 period (Table 6). Annual value of the harvest for these same periods declined from \$101 thousand to \$26 thousand.

## Herring

Pacific herring in the AYK Region have been harvested in significant quantity by domestic commercial fishermen for sac roe extraction since 1979. Gill nets

are the legal commercial gear, along with beach seines in the Norton Sound Area. Small commercial fisheries for food or bait occurred on an irregular basis prior to 1979, but are not included in this report. Neither is included a very small roe-on-kelp fishery which occurred in Norton Sound for several years prior to its closure by the Board of Fisheries in 1985.

Sac roe fisheries have occurred discontinuously along coastal spawning grounds in the Kuskokwim, Yukon, and Norton Sound Areas. Unlike salmon fisheries, which may occur over a period of several months, these fisheries are characterized by a short intensive season from mid-May to early June. Fish not meeting minimum industry standards for roe recovery are often sold as bait herring.

The majority of the harvest has occurred in the Norton Sound Area, with the Kuskokwim Area second and Yukon Area third (Figure 5). Total annual harvest for the region has ranged from 1.8 thousand tons in 1979 to 9.8 thousand tons in 1986. Increase in value for these fisheries has been even greater, from \$0.9 million in 1980 to \$6.7 million in 1988. Effort increased from 169 fishermen in 1979 to 1,220 in 1987. Effort restrictions and allocation to local fishermen have been attempted through Board of Fisheries regulations concerning exclusive use, and the phasing in of limited entry beginning in 1988.

Comparison of annual averages for the recent 5-year period (1984-88) to the prior 5-year period (1979-83) indicates a growth in harvest from 5.1 to 7.7 thousand tons, effort from 524 to 803 fishermen, and value from \$1.7 to \$4.4 million (Table 7).

### *Crab*

The only significant commercial fishery for shellfish in the AYK Region is for red king crab in Norton Sound during the summer season. Harvest is restricted to males exceeding a minimum carapace width established by the Board of Fisheries, and pots are the only legal harvest gear. A winter fishery through shore ice in the Nome area accounts for a small number of crab entering commercial markets, but these were excluded from this report.

The summer red king crab commercial fishery began in 1977. Unlike the salmon and herring fisheries described previously, the crab fishery reached its peak immediately after its inception and has been in a depressed state since 1982 (Figure 6). After the 1977 exploratory season, annual harvests ranged from a record of 2.9 million lb in 1979 to 0.2 million lb in 1982 and 1988. Value ranged from \$1.9 million in 1978 and 1979 to \$0.4 million in 1984 and 1988. Rapid harvest of the majority of the available legal males and poor recruitment have been the cause of the harvest decline. Effort dropped from 36 vessels in 1981 to only 2 in 1988.

The decline in the red king crab summer commercial fishery is evident from a comparison of statistics for the recent 5-year period (1984-88) with the previous five-year period (1979-83). During the earlier period an average of 23 vessels delivered 1.2 million lb worth \$1.0 million annually, while during the more recent period an average of 6 vessels delivered 0.4 million lb worth \$0.5 million (Table 8).

## *Regional Summary*

Combined value of the salmon, herring, and red king crab commercial fisheries in the AYK Region averaged \$21.4 million annually during the 1984-88 period (Figure 7). For all species combined, the Yukon Area accounted for 41% of the total value, followed by the Kuskokwim Area (36%), Norton Sound Area (16%), and Kotzebue Area (7%). For all areas combined, chum salmon accounted for 29% of the total value, followed by chinook salmon (27%), herring (21%), coho salmon (17%), sockeye salmon (4%), and red king crab (2%).

Ranking by value of individual fisheries, as defined by management area and species, indicates that fifteen different fisheries had an average annual value greater than \$0.1 million during the 1984-88 period (Table 9). Of these the Yukon chinook salmon fishery had the greatest value (\$4.5 million), followed by fisheries for Kuskokwim coho salmon (\$3.2 million), Yukon chum salmon (\$3.1 million), Norton Sound herring (\$2.4 million), and Kotzebue chum salmon (\$1.5 million).

## **DISCUSSION**

The purpose of this report was to present commercial harvest, effort, and ex-vessel value data for all areas and commercial fisheries in the AYK Region. This was the first time these data were compiled in a comprehensive manner for this region. A more complete understanding of the fisheries resources would require a synthesis of additional information regarding stock sizes, spawning escapements, habitat status, harvests by other user groups, and agency management strategies.

Commercial fisheries in the AYK Region have expanded substantially from the 1960's through the 1980's, due largely to development of chum and coho salmon fisheries and the inception of herring sac roe and red king crab fisheries. Annual ex-vessel value for all commercial fisheries in the AYK Region combined increased by a factor of 36 from an average of \$0.6 million in 1961-65 to an average of \$21.4 million in 1984-88 (Figure 8). Even when these figures are adjusted for inflation based on the Anchorage CPI the average annual ex-vessel value increased by a factor of nearly 12 between these two periods.

The growth and diversification of these fisheries since the late 1970's is apparent by comparison of the harvest in 1976 with that of 1988. In 1976, 1.6 million salmon were harvested with an ex-vessel value of \$4.4 million. In 1988, 4.4 million salmon, 260 thousand lb of salmon roe, 7.8 thousand tons of herring, and 237 thousand lb of red king crab were harvested having a record ex-vessel value of \$36.3 million. Value increased by a factor of eight in 12 years. Even when these figures are adjusted for inflation the ex-vessel value increased by a factor of nearly five in 12 years.

To the residents in this mostly rural region the commercial fisheries represent an important component of the local economy. Development and diversification of the commercial fisheries has led to a greater demand for maximizing harvests and including the public in harvest regulation decisions. This has increased the need

for comprehensive and timely technical data analysis for fisheries management purposes, and reduced the margin for error in terms of stock conservation. Fisheries management objectives are made more difficult by the lack of comprehensive historical information, the complexities of multiple user groups and mixed stocks, and the logistics of operating in a vast and remote region.



## LITERATURE CITED

- ADF&G (Alaska Department of Fish and Game). 1972. Arctic-Yukon-Kuskokwim Region subsistence fishery report. Alaska Department of Fish and Game, Division of Commercial Fisheries, Region 3 Report (unpublished), Anchorage.
- Bergstrom, D.J., and D.G. Gnath. 1988. Subsistence harvest of Pacific salmon in the Yukon River drainage, Alaska, 1987. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A88-21, Anchorage.
- Francisco, R.K., and four coauthors. 1988a. 1987 Annual management report, Kuskokwim Area. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3B88-35, Anchorage.
- Francisco, R.K., and three coauthors. 1988b. Kuskokwim Area salmon report to the Alaska Board of Fisheries, 1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3B88-37, Anchorage.
- Fried, S.M., C. Whitmore, and D. Bergstrom. 1981. Pacific herring stocks and fisheries in the Eastern Bering Sea, Alaska, 1981. Alaska Department of Fish and Game, Division of Commercial Fisheries, Report to the Alaska Board of Fisheries, Anchorage.
- Geiger, M.F., and F.M. Andersen. 1977. Annual management report, 1977 Yukon Area. Alaska Department of Fish and Game, Division of Commercial Fisheries, Region 3 Report (unpublished), Anchorage.
- Hamner, H.H. 1988. Pacific herring stocks and fisheries in the Arctic-Yukon-Kuskokwim Region of the Northeastern Bering Sea, Alaska, 1988. Report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A88-38, Anchorage.
- Jonrowe, D.A.S., R. Baxter, and D. Schneiderhan. 1980. Annual salmon management report, 1980 Kuskokwim Area. Alaska Department of Fish and Game, Division of Commercial Fisheries, Region 3 Report (unpublished), Anchorage.
- Jonrowe, D.A.S., and three coauthors. 1982. Annual management report, 1981 Kuskokwim Area. Alaska Department of Fish and Game, Division of Commercial Fisheries, Region 3 Report (unpublished), Anchorage.
- Jonrowe, D.A.S., and three coauthors. 1983. Annual management report, 1982 Kuskokwim Area. Alaska Department of Fish and Game, Division of Commercial Fisheries, Region 3 Report (unpublished), Anchorage.
- Jonrowe, D.A.S., and six coauthors. 1984. Annual management report, 1983 Kuskokwim Area. Alaska Department of Fish and Game, Division of Commercial Fisheries, Region 3 Report (unpublished), Anchorage.

### LITERATURE CITED (Continued)

- Jonrowe, M., R. Baxter, and G. Schaefer. 1977. Annual management report, 1977 Kuskokwim District. Alaska Department of Fish and Game, Division of Commercial Fisheries, Region 3 Report (unpublished), Anchorage.
- Jonrowe, M., R. Baxter, and D. Schneiderhan. 1978. Annual management report, 1978 Kuskokwim District. Alaska Department of Fish and Game, Division of Commercial Fisheries, Region 3 Report (unpublished), Anchorage.
- Jonrowe, M., R. Baxter, and D. Schneiderhan. 1979. Annual management report, 1979 Kuskokwim District. Alaska Department of Fish and Game, Division of Commercial Fisheries, Region 3 Report (unpublished), Anchorage.
- Kuhlmann, F.W. 1977. Annual management report, 1977 Norton Sound-Port Clarence-Kotzebue. Alaska Department of Fish and Game, Division of Commercial Fisheries, Region 3 Report (unpublished), Anchorage.
- Kuhlmann, F.W., R. Baxter, and G. Schaefer. 1975. Annual management report, 1975 Kuskokwim District. Alaska Department of Fish and Game, Division of Commercial Fisheries, Region 3 Report (unpublished), Anchorage.
- Lean, C.F., and S.E. Merkouris. 1988a. Norton Sound Area salmon report to the Alaska Board of Fisheries, 1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3N88-36, Anchorage.
- Lean, C.F., and S.E. Merkouris. 1988b. Kotzebue Area salmon report to the Alaska Board of Fisheries, 1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3N88-39, Anchorage.
- Lean, C.F., and S.E. Merkouris. 1989. Norton Sound Area shellfish report to the Alaska Board of Fisheries, 1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3N89-05.
- Merkouris, S.E., and C.F. Lean. 1988. Annual management report, 1987 Norton Sound-Port Clarence-Kotzebue. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3N88-27, Anchorage.
- Pete, M.C., and R.E. Kreher. 1986. Subsistence herring fishing in the Nelson Island District, 1986. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 144, Bethel.
- Regnart, R.I., and four coauthors. 1974. Annual management report, 1974 Arctic-Yukon-Kuskokwim Region. Alaska Department of Fish and Game, Division of Commercial Fisheries, Region 3 Report (unpublished), Anchorage.

#### LITERATURE CITED (Continued)

- Whitmore, C., and five coauthors. 1988a. Annual management report, 1987 Yukon Area. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A88-30, Anchorage.
- Whitmore, C., D. Bergstrom, and F. Andersen. 1988b. Yukon Area salmon report to the Alaska Board of Fisheries, 1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A88-40, Anchorage.

## TABLES AND FIGURES

Table 1. Salmon commercial effort and ex-vessel value in the Arctic-Yukon-Kuskokwim Region, 1961-88.

| Year      | Kuskokwim Area <sup>a</sup> |        | Yukon Area <sup>a</sup> |        | Norton Sound Area <sup>a</sup> |       | Kotzebue Area <sup>a</sup> |       | Regional Total <sup>a</sup> |        |
|-----------|-----------------------------|--------|-------------------------|--------|--------------------------------|-------|----------------------------|-------|-----------------------------|--------|
|           | Effort                      | Value  | Effort                  | Value  | Effort                         | Value | Effort                     | Value | Effort                      | Value  |
| 1961      | 170                         | 80     | 350                     | 437    | 62                             | 54    | 0                          | 0     | 582                         | 572    |
| 1962      | 307                         | 83     | 490                     | 362    | 143                            | 106   | 84                         | 46    | 1,024                       | 596    |
| 1963      | 157                         | 66     | 413                     | 412    | 144                            | 104   | 59                         | 9     | 773                         | 591    |
| 1964      | 175                         | 86     | 452                     | 354    | 133                            | 72    | 48                         | 35    | 808                         | 547    |
| 1965      | 224                         | 87     | 487                     | 542    | 78                             | 21    | 43                         | 18    | 832                         | 668    |
| 1966      | 210                         | 87     | 517                     | 455    | 117                            | 69    | 44                         | 25    | 888                         | 636    |
| 1967      | 256                         | 139    | 549                     | 606    | 79                             | 44    | 30                         | 29    | 914                         | 818    |
| 1968      | 418                         | 291    | 512                     | 535    | 113                            | 59    | 59                         | 46    | 1,102                       | 930    |
| 1969      | 482                         | 362    | 503                     | 519    | 149                            | 95    | 52                         | 71    | 1,186                       | 1,047  |
| 1970      | 479                         | 362    | 549                     | 623    | 127                            | 84    | 82                         | 186   | 1,237                       | 1,255  |
| 1971      | 548                         | 266    | 634                     | 783    | 145                            | 101   | 87                         | 200   | 1,414                       | 1,349  |
| 1972      | 520                         | 354    | 661                     | 784    | 171                            | 102   | 87                         | 260   | 1,439                       | 1,500  |
| 1973      | 558                         | 827    | 740                     | 1,217  | 219                            | 309   | 136                        | 925   | 1,653                       | 3,279  |
| 1974      | 905                         | 1,057  | 771                     | 1,921  | 228                            | 437   | 174                        | 1,823 | 2,078                       | 5,238  |
| 1975      | 804                         | 979    | 988                     | 1,794  | 300                            | 343   | 258                        | 1,366 | 2,350                       | 4,482  |
| 1976      | 826                         | 1,399  | 962                     | 2,151  | 212                            | 280   | 219                        | 580   | 2,219                       | 4,410  |
| 1977      | 822                         | 3,902  | 808                     | 4,069  | 178                            | 529   | 222                        | 1,034 | 2,030                       | 9,533  |
| 1978      | 872                         | 2,343  | 826                     | 5,315  | 176                            | 812   | 208                        | 575   | 2,082                       | 9,045  |
| 1979      | 805                         | 3,328  | 836                     | 7,620  | 175                            | 876   | 181                        | 990   | 1,997                       | 12,814 |
| 1980      | 803                         | 2,731  | 826                     | 6,338  | 159                            | 579   | 176                        | 1,447 | 1,964                       | 11,094 |
| 1981      | 826                         | 3,614  | 836                     | 10,652 | 167                            | 764   | 187                        | 3,247 | 2,016                       | 18,276 |
| 1982      | 810                         | 4,273  | 820                     | 7,141  | 164                            | 999   | 199                        | 1,962 | 1,993                       | 14,375 |
| 1983      | 800                         | 2,675  | 809                     | 6,984  | 170                            | 1,032 | 189                        | 421   | 1,968                       | 11,113 |
| 1984      | 774                         | 5,796  | 808                     | 5,689  | 141                            | 721   | 181                        | 1,149 | 1,904                       | 13,355 |
| 1985      | 781                         | 3,255  | 816                     | 7,032  | 155                            | 828   | 189                        | 2,137 | 1,941                       | 13,252 |
| 1986      | 789                         | 4,754  | 834                     | 6,249  | 163                            | 539   | 187                        | 931   | 1,973                       | 12,473 |
| 1987      | 798                         | 6,385  | 800                     | 7,164  | 164                            | 501   | 160                        | 515   | 1,922                       | 14,566 |
| 1988      | 811                         | 12,514 | 853                     | 13,379 | 152                            | 745   | 193                        | 2,581 | 2,009                       | 29,219 |
| AVG 74-78 | 846                         | 1,936  | 871                     | 3,050  | 219                            | 480   | 216                        | 1,076 | 2,152                       | 6,542  |
| Avg 79-83 | 809                         | 3,324  | 825                     | 7,747  | 167                            | 850   | 186                        | 1,613 | 1,988                       | 13,534 |
| Avg 84-88 | 791                         | 6,541  | 822                     | 7,903  | 155                            | 667   | 182                        | 1,463 | 1,950                       | 16,573 |

<sup>a</sup>Effort for 1961 through 1977 is the number of vessel licenses issued annually within each area, while effort for 1978 through 1988 is the number of CFEC permit holders making at least one delivery annually. The only exception is that for the Kuskokwim Area in 1978 through 1983, effort is the number of CFEC permits issued annually, since the number of fishermen making at least one delivery is not available. Value is the price paid to fishermen in thousands of dollars.

Table 2. Chum salmon commercial harvest and ex-vessel value in the Arctic-Yukon-Kuskokwim Region, 1961-88. Harvest is in thousands of fish, or thousands of lb of roe. Value is the price paid to fishermen in thousands of dollars.

| Year      | Kuskokwim Area |       | Yukon Area <sup>a</sup> |                  |       | Norton Sound Area |       | Kotzebue Area |       | Regional Total |                  |        |
|-----------|----------------|-------|-------------------------|------------------|-------|-------------------|-------|---------------|-------|----------------|------------------|--------|
|           | Fish           | Value | Fish                    | Roe <sup>b</sup> | Value | Fish              | Value | Fish          | Value | Fish           | Roe <sup>b</sup> | Value  |
| 1961      | 18.9           | 2     | 42.5                    | 0.0              | 15    | 48.3              | 17    | 0.0           | 0     | 109.7          | 0.0              | 34     |
| 1962      | 45.7           | 5     | 53.1                    | 0.0              | 20    | 182.8             | 64    | 129.9         | 46    | 411.5          | 0.0              | 134    |
| 1963      | 0.0            | 0     | 0.0                     | 0.0              | 0     | 154.8             | 54    | 54.4          | 9     | 209.2          | 0.0              | 63     |
| 1964      | 0.7            | 0     | 8.3                     | 0.0              | 2     | 148.9             | 60    | 76.5          | 35    | 234.4          | 0.0              | 97     |
| 1965      | 4.2            | 0     | 23.3                    | 0.0              | 11    | 36.8              | 15    | 40.0          | 18    | 104.3          | 0.0              | 44     |
| 1966      | 2.6            | 0     | 71.0                    | 0.0              | 25    | 80.2              | 52    | 30.8          | 25    | 184.6          | 0.0              | 102    |
| 1967      | 8.2            | 2     | 49.2                    | 0.0              | 17    | 41.8              | 26    | 29.4          | 29    | 128.6          | 0.0              | 74     |
| 1968      | 19.7           | 7     | 67.4                    | 0.0              | 34    | 45.3              | 31    | 30.2          | 46    | 162.6          | 0.0              | 118    |
| 1969      | 50.4           | 22    | 193.3                   | 0.0              | 96    | 82.8              | 58    | 59.3          | 71    | 385.8          | 0.0              | 247    |
| 1970      | 60.6           | 31    | 346.6                   | 0.0              | 212   | 107.0             | 61    | 159.7         | 186   | 673.9          | 0.0              | 490    |
| 1971      | 99.4           | 50    | 289.7                   | 0.0              | 183   | 131.4             | 86    | 155.0         | 200   | 675.5          | 0.0              | 518    |
| 1972      | 97.2           | 53    | 287.8                   | 0.0              | 216   | 100.9             | 78    | 169.7         | 260   | 655.6          | 0.0              | 607    |
| 1973      | 184.2          | 236   | 517.6                   | 0.0              | 609   | 119.1             | 271   | 375.4         | 925   | 1,196.3        | 0.0              | 2,041  |
| 1974      | 196.1          | 335   | 879.7                   | 0.0              | 1,011 | 162.3             | 346   | 627.9         | 1,823 | 1,866.0        | 0.0              | 3,516  |
| 1975      | 223.5          | 407   | 985.3                   | 0.0              | 1,201 | 212.5             | 316   | 563.3         | 1,366 | 1,984.6        | 0.0              | 3,290  |
| 1976      | 231.9          | 438   | 757.3                   | 0.0              | 1,159 | 96.0              | 201   | 159.7         | 580   | 1,244.9        | 0.0              | 2,379  |
| 1977      | 299.0          | 982   | 792.9                   | 0.0              | 1,997 | 200.5             | 425   | 195.9         | 1,034 | 1,488.3        | 0.0              | 4,438  |
| 1978      | 282.0          | 803   | 1,288.6                 | 36.4             | 3,102 | 189.3             | 417   | 111.5         | 575   | 1,871.4        | 36.4             | 4,897  |
| 1979      | 297.2          | 770   | 1,139.3                 | 58.7             | 4,527 | 140.8             | 411   | 141.5         | 990   | 1,718.8        | 58.7             | 6,698  |
| 1980      | 561.5          | 863   | 1,222.0                 | 144.1            | 2,677 | 180.8             | 299   | 367.3         | 1,447 | 2,331.6        | 144.1            | 5,285  |
| 1981      | 485.6          | 838   | 1,473.4                 | 200.4            | 5,924 | 169.7             | 334   | 677.2         | 3,247 | 2,805.9        | 200.4            | 10,343 |
| 1982      | 325.5          | 523   | 685.6                   | 153.6            | 3,116 | 183.3             | 428   | 417.8         | 1,962 | 1,612.2        | 153.6            | 6,029  |
| 1983      | 306.6          | 749   | 1,047.5                 | 155.1            | 2,757 | 319.4             | 659   | 175.8         | 421   | 1,849.3        | 155.1            | 4,585  |
| 1984      | 488.5          | 916   | 796.8                   | 169.6            | 1,800 | 146.4             | 245   | 320.2         | 1,149 | 1,751.9        | 169.6            | 4,110  |
| 1985      | 224.7          | 399   | 784.7                   | 251.2            | 2,440 | 134.9             | 291   | 521.4         | 2,137 | 1,665.7        | 251.2            | 5,268  |
| 1986      | 349.3          | 594   | 860.9                   | 272.3            | 2,798 | 146.9             | 273   | 261.4         | 931   | 1,618.5        | 272.3            | 4,596  |
| 1987      | 603.3          | 1,108 | 442.2                   | 122.0            | 1,643 | 102.5             | 241   | 109.5         | 515   | 1,257.5        | 122.0            | 3,507  |
| 1988      | 1,443.9        | 3,974 | 1,286.2                 | 259.7            | 7,005 | 108.0             | 301   | 352.9         | 2,581 | 3,191.0        | 259.7            | 13,861 |
| Avg 74-78 | 246.5          | 593   | 940.8                   | 7.3              | 1,694 | 172.1             | 341   | 331.7         | 1,076 | 1,691.0        | 7.3              | 3,704  |
| Avg 79-83 | 395.3          | 748   | 1,113.6                 | 142.4            | 3,800 | 198.8             | 426   | 355.9         | 1,613 | 2,063.6        | 142.4            | 6,588  |
| Avg 84-88 | 621.9          | 1,398 | 834.2                   | 215.0            | 3,137 | 127.7             | 270   | 313.1         | 1,463 | 1,896.9        | 215.0            | 6,268  |

<sup>a</sup>Includes both summer and fall run chum salmon for the Yukon Area.

<sup>b</sup>May include small amount of chinook or coho salmon roe in some years. Roe sales are predominantly from summer run chum salmon in the upper Yukon River fishing districts.

Table 3. Chinook salmon commercial harvest and ex-vessel value in the Arctic-Yukon-Kuskokwim Region, 1961-88. Harvest is in thousands of fish. Value is the price paid to fishermen in thousands of dollars.

| Year      | Kuskokwim Area |       | Yukon Area |       | Norton Sound Area |       | Regional Total <sup>a</sup> |       |
|-----------|----------------|-------|------------|-------|-------------------|-------|-----------------------------|-------|
|           | Harvest        | Value | Harvest    | Value | Harvest           | Value | Harvest                     | Value |
| 1961      | 23.2           | 75    | 119.7      | 421   | 5.3               | 20    | 148.2                       | 517   |
| 1962      | 20.9           | 68    | 94.7       | 330   | 7.3               | 28    | 122.9                       | 426   |
| 1963      | 18.6           | 61    | 117.0      | 410   | 6.6               | 25    | 142.2                       | 495   |
| 1964      | 21.2           | 69    | 93.6       | 351   | 2.0               | 9     | 116.8                       | 429   |
| 1965      | 25.0           | 81    | 118.1      | 531   | 1.4               | 5     | 144.5                       | 618   |
| 1966      | 25.8           | 77    | 93.3       | 420   | 1.6               | 8     | 120.7                       | 505   |
| 1967      | 30.0           | 107   | 129.7      | 584   | 1.8               | 8     | 161.5                       | 699   |
| 1968      | 43.2           | 162   | 106.5      | 494   | 1.0               | 6     | 150.7                       | 662   |
| 1969      | 64.8           | 246   | 91.0       | 415   | 2.4               | 11    | 158.2                       | 673   |
| 1970      | 65.0           | 246   | 79.1       | 401   | 1.9               | 10    | 146.0                       | 657   |
| 1971      | 44.9           | 203   | 110.5      | 590   | 2.6               | 11    | 158.0                       | 804   |
| 1972      | 55.5           | 273   | 92.8       | 548   | 2.9               | 16    | 151.2                       | 837   |
| 1973      | 51.3           | 350   | 75.4       | 561   | 1.9               | 16    | 128.6                       | 927   |
| 1974      | 30.7           | 244   | 98.1       | 881   | 3.0               | 22    | 131.8                       | 1,148 |
| 1975      | 27.8           | 255   | 63.8       | 589   | 2.4               | 10    | 94.0                        | 855   |
| 1976      | 49.3           | 536   | 87.8       | 984   | 2.2               | 17    | 139.3                       | 1,537 |
| 1977      | 58.3           | 1,513 | 96.8       | 1,928 | 4.5               | 67    | 159.6                       | 3,508 |
| 1978      | 63.2           | 765   | 99.2       | 2,134 | 9.8               | 145   | 172.2                       | 3,043 |
| 1979      | 53.3           | 584   | 127.7      | 3,008 | 10.7              | 204   | 191.7                       | 3,796 |
| 1980      | 48.2           | 319   | 154.0      | 3,639 | 6.3               | 100   | 208.5                       | 4,059 |
| 1981      | 79.4           | 1,187 | 158.0      | 4,636 | 7.9               | 205   | 245.3                       | 6,028 |
| 1982      | 79.8           | 1,263 | 123.6      | 3,871 | 5.9               | 122   | 209.3                       | 5,256 |
| 1983      | 93.7           | 951   | 147.9      | 4,199 | 10.3              | 203   | 251.9                       | 5,353 |
| 1984      | 74.0           | 1,080 | 119.9      | 3,620 | 8.5               | 203   | 202.4                       | 4,903 |
| 1985      | 74.1           | 894   | 146.2      | 4,389 | 19.5              | 453   | 239.8                       | 5,736 |
| 1986      | 45.0           | 612   | 100.0      | 3,239 | 6.4               | 117   | 151.4                       | 3,968 |
| 1987      | 65.6           | 1,097 | 132.0      | 5,521 | 7.1               | 157   | 204.7                       | 6,775 |
| 1988      | 74.6           | 1,371 | 101.4      | 5,606 | 4.1               | 85    | 180.1                       | 7,061 |
| <hr/>     |                |       |            |       |                   |       |                             |       |
| Avg 74-78 | 45.9           | 663   | 89.1       | 1,303 | 4.4               | 52    | 139.4                       | 2,018 |
| Avg 79-83 | 70.9           | 861   | 142.2      | 3,871 | 8.2               | 167   | 221.3                       | 4,898 |
| Avg 84-88 | 66.7           | 1,011 | 119.9      | 4,475 | 9.1               | 203   | 195.7                       | 5,689 |

<sup>a</sup>Chinook salmon commercial harvest in the Kotzebue Area is below one thousand fish annually, and is not included here.

Table 4. Coho salmon commercial harvest and ex-vessel value in the Arctic-Yukon-Kuskokwim Region, 1961-88. Harvest is in thousands of fish. Value is the price paid to fishermen in thousands of dollars.

| Year      | Kuskokwim Area |       | Yukon Area |       | Norton Sound Area |       | Regional Total <sup>a</sup> |       |
|-----------|----------------|-------|------------|-------|-------------------|-------|-----------------------------|-------|
|           | Harvest        | Value | Harvest    | Value | Harvest           | Value | Harvest                     | Value |
| 1961      | 5.1            | 2     | 2.9        | 1     | 13.8              | 8     | 21.8                        | 12    |
| 1962      | 12.6           | 4     | 22.9       | 12    | 9.2               | 6     | 44.7                        | 21    |
| 1963      | 15.7           | 6     | 5.6        | 3     | 16.8              | 10    | 38.1                        | 18    |
| 1964      | 29.0           | 10    | 2.4        | 1     | 0.1               | 0     | 31.5                        | 12    |
| 1965      | 12.2           | 4     | 0.4        | 0     | 2.0               | 1     | 14.6                        | 5     |
| 1966      | 23.0           | 9     | 19.3       | 10    | 5.8               | 6     | 48.1                        | 25    |
| 1967      | 58.2           | 30    | 11.0       | 6     | 2.4               | 2     | 71.6                        | 38    |
| 1968      | 154.3          | 103   | 13.3       | 7     | 6.9               | 7     | 174.5                       | 117   |
| 1969      | 110.5          | 84    | 15.1       | 8     | 6.9               | 7     | 132.5                       | 99    |
| 1970      | 62.2           | 64    | 13.2       | 10    | 4.4               | 4     | 79.8                        | 78    |
| 1971      | 10.0           | 8     | 12.2       | 10    | 3.1               | 3     | 25.3                        | 21    |
| 1972      | 23.9           | 24    | 22.2       | 20    | 0.5               | 1     | 46.6                        | 45    |
| 1973      | 152.4          | 229   | 36.6       | 47    | 9.3               | 10    | 198.3                       | 285   |
| 1974      | 179.6          | 359   | 16.8       | 28    | 2.1               | 2     | 198.5                       | 390   |
| 1975      | 109.8          | 266   | 2.5        | 4     | 4.6               | 5     | 116.9                       | 274   |
| 1976      | 112.1          | 350   | 5.2        | 9     | 6.9               | 16    | 124.2                       | 374   |
| 1977      | 263.7          | 1,337 | 38.9       | 143   | 3.7               | 11    | 306.3                       | 1,491 |
| 1978      | 247.3          | 702   | 26.2       | 79    | 7.3               | 18    | 280.8                       | 799   |
| 1979      | 308.7          | 1,829 | 17.2       | 84    | 31.4              | 166   | 357.3                       | 2,079 |
| 1980      | 327.9          | 1,448 | 8.7        | 22    | 29.8              | 129   | 366.4                       | 1,599 |
| 1981      | 278.6          | 1,123 | 23.7       | 92    | 31.6              | 132   | 333.9                       | 1,347 |
| 1982      | 567.5          | 2,196 | 37.2       | 154   | 91.7              | 370   | 696.4                       | 2,719 |
| 1983      | 249.0          | 660   | 13.3       | 29    | 49.7              | 141   | 312.0                       | 830   |
| 1984      | 830.0          | 3,515 | 81.9       | 269   | 67.9              | 236   | 979.8                       | 4,019 |
| 1985      | 382.1          | 1,462 | 57.7       | 203   | 22.0              | 81    | 461.8                       | 1,745 |
| 1986      | 736.9          | 2,830 | 47.3       | 213   | 35.6              | 129   | 819.8                       | 3,171 |
| 1987      | 478.6          | 2,516 | 0.0        | 0     | 24.3              | 101   | 502.9                       | 2,617 |
| 1988      | 623.7          | 5,578 | 86.6       | 769   | 37.2              | 317   | 747.5                       | 6,663 |
| <hr/>     |                |       |            |       |                   |       |                             |       |
| Avg 74-78 | 182.5          | 603   | 17.9       | 53    | 4.9               | 11    | 205.3                       | 666   |
| Avg 79-83 | 346.3          | 1,451 | 20.0       | 76    | 46.8              | 187   | 413.2                       | 1,715 |
| Avg 84-88 | 610.3          | 3,180 | 54.7       | 291   | 37.4              | 173   | 702.4                       | 3,643 |

<sup>a</sup> Coho salmon commercial harvest in the Kotzebue Area is below one thousand fish annually, and is not included here.



Table 5. Sockeye salmon commercial harvest and ex-vessel value in the Arctic-Yukon-Kuskokwim Region, 1961-88. Harvest is in thousands of fish. Value is the price paid to fishermen in thousands of dollars.

| Year      | Kuskokwim Area <sup>a</sup> |       |
|-----------|-----------------------------|-------|
|           | Harvest                     | Value |
| 1961      | 2.3                         | 1     |
| 1962      | 10.3                        | 5     |
| 1963      | 0.0                         | 0     |
| 1964      | 13.4                        | 7     |
| 1965      | 1.9                         | 1     |
| 1966      | 1.0                         | 1     |
| 1967      | 0.7                         | 0     |
| 1968      | 5.9                         | 4     |
| 1969      | 10.4                        | 10    |
| 1970      | 12.7                        | 15    |
| 1971      | 6.1                         | 4     |
| 1972      | 4.3                         | 4     |
| 1973      | 5.2                         | 12    |
| 1974      | 29.0                        | 62    |
| 1975      | 17.5                        | 50    |
| 1976      | 13.6                        | 39    |
| 1977      | 18.6                        | 70    |
| 1978      | 13.7                        | 44    |
| 1979      | 39.5                        | 145   |
| 1980      | 42.2                        | 88    |
| 1981      | 105.9                       | 465   |
| 1982      | 97.7                        | 288   |
| 1983      | 90.8                        | 315   |
| 1984      | 81.3                        | 279   |
| 1985      | 121.2                       | 501   |
| 1986      | 142.0                       | 716   |
| 1987      | 170.8                       | 1,665 |
| 1988      | 149.9                       | 1,572 |
| <hr/>     |                             |       |
| Avg 74-78 | 18.5                        | 53    |
| Avg 79-83 | 75.2                        | 260   |
| Avg 84-88 | 133.0                       | 946   |

<sup>a</sup>Sockeye salmon commercial harvest in the Yukon, Norton Sound, and Kotzebue Areas is below one thousand fish in each area annually, and is not included here. Therefore the Kuskokwim Area harvest is equivalent to the regional total.

Table 6. Pink salmon commercial harvest and ex-vessel value in the Arctic-Yukon-Kuskokwim Region, 1961-88. Harvest is in thousands of fish. Value is the price paid to fishermen in thousands of dollars.

| Year      | Kuskokwim Area |       | Norton Sound Area |       | Regional Total <sup>a</sup> |       |
|-----------|----------------|-------|-------------------|-------|-----------------------------|-------|
|           | Harvest        | Value | Harvest           | Value | Harvest                     | Value |
| 1961      | 0.0            | 0     | 34.3              | 9     | 34.3                        | 9     |
| 1962      | 4.3            | 0     | 33.2              | 8     | 37.5                        | 9     |
| 1963      | 0.0            | 0     | 55.6              | 14    | 55.6                        | 14    |
| 1964      | 0.9            | 0     | 13.6              | 3     | 14.5                        | 4     |
| 1965      | 0.0            | 0     | 0.2               | 0     | 0.2                         | 0     |
| 1966      | 0.3            | 0     | 12.8              | 3     | 13.1                        | 3     |
| 1967      | 0.0            | 0     | 28.9              | 7     | 28.9                        | 7     |
| 1968      | 75.8           | 15    | 71.2              | 15    | 147.0                       | 30    |
| 1969      | 1.3            | 0     | 86.9              | 19    | 88.2                        | 19    |
| 1970      | 27.4           | 7     | 64.9              | 9     | 92.3                        | 17    |
| 1971      | 0.0            | 0     | 4.9               | 1     | 4.9                         | 1     |
| 1972      | 2.0            | 1     | 45.2              | 8     | 47.2                        | 9     |
| 1973      | 0.6            | 0     | 46.5              | 13    | 47.1                        | 13    |
| 1974      | 60.1           | 56    | 148.5             | 67    | 208.6                       | 122   |
| 1975      | 0.9            | 1     | 32.4              | 11    | 33.3                        | 12    |
| 1976      | 40.0           | 35    | 87.9              | 46    | 127.9                       | 81    |
| 1977      | 0.4            | 0     | 48.7              | 26    | 49.1                        | 26    |
| 1978      | 62.0           | 29    | 325.5             | 233   | 387.5                       | 262   |
| 1979      | 0.6            | 0     | 167.4             | 96    | 168.0                       | 96    |
| 1980      | 30.3           | 13    | 227.4             | 50    | 257.7                       | 64    |
| 1981      | 0.5            | 0     | 232.5             | 94    | 233.0                       | 94    |
| 1982      | 18.3           | 3     | 230.3             | 79    | 248.6                       | 82    |
| 1983      | 0.4            | 0     | 76.9              | 30    | 77.3                        | 30    |
| 1984      | 23.9           | 5     | 119.4             | 38    | 143.3                       | 43    |
| 1985      | 0.1            | 0     | 3.6               | 2     | 3.7                         | 2     |
| 1986      | 16.6           | 3     | 41.3              | 20    | 57.9                        | 23    |
| 1987      | 0.2            | 0     | 2.3               | 1     | 2.5                         | 1     |
| 1988      | 37.6           | 20    | 74.6              | 43    | 112.2                       | 62    |
| <hr/>     |                |       |                   |       |                             |       |
| Avg 74-78 | 32.7           | 24    | 128.6             | 77    | 161.3                       | 101   |
| Avg 79-83 | 10.0           | 3     | 186.9             | 70    | 196.9                       | 73    |
| Avg 84-88 | 15.7           | 6     | 48.2              | 21    | 63.9                        | 26    |

<sup>a</sup>Pink salmon commercial harvest in the Yukon and Kotzebue Areas is below one thousand fish in each area annually, and is not included here.

Table 7. Herring commercial harvest, effort, and ex-vessel value in the Arctic-Yukon-Kuskokwim Region, 1979-88.

| Year      | Kuskokwim Area <sup>a</sup> |        |       | Yukon Area <sup>a</sup> |        |       | Norton Sound Area <sup>a,b</sup> |        |       | Regional Total <sup>a</sup> |        |       |
|-----------|-----------------------------|--------|-------|-------------------------|--------|-------|----------------------------------|--------|-------|-----------------------------|--------|-------|
|           | Harvest                     | Effort | Value | Harvest                 | Effort | Value | Harvest                          | Effort | Value | Harvest                     | Effort | Value |
| 1979      | 514                         | 102    | 366   | 0                       | 0      | 0     | 1,292                            | 67     | 600   | 1,806                       | 169    | 966   |
| 1980      | 1,145                       | 340    | 248   | 611                     | 69     | 130   | 2,452                            | 294    | 500   | 4,208                       | 703    | 878   |
| 1981      | 1,830                       | 288    | 543   | 720                     | 111    | 211   | 4,371                            | 332    | 1,500 | 6,921                       | 731    | 2,254 |
| 1982      | 1,299                       | 191    | 459   | 657                     | 75     | 222   | 3,933                            | 237    | 1,046 | 5,889                       | 503    | 1,727 |
| 1983      | 1,508                       | 178    | 628   | 816                     | 63     | 367   | 4,582                            | 272    | 1,519 | 6,906                       | 513    | 2,514 |
| 1984      | 1,052                       | 168    | 278   | 1,185                   | 66     | 306   | 3,662                            | 199    | 888   | 5,899                       | 433    | 1,472 |
| 1985      | 2,792                       | 370    | 1,337 | 1,299                   | 73     | 550   | 3,548                            | 278    | 1,438 | 7,639                       | 721    | 3,325 |
| 1986      | 2,705                       | 391    | 1,501 | 1,865                   | 97     | 1,142 | 5,194                            | 323    | 2,900 | 9,764                       | 811    | 5,543 |
| 1987      | 1,971                       | 478    | 1,267 | 1,342                   | 157    | 1,000 | 4,228                            | 585    | 2,690 | 7,541                       | 1,220  | 4,957 |
| 1988      | 1,930                       | 363    | 1,802 | 1,119                   | 113    | 1,018 | 4,752                            | 356    | 3,907 | 7,801                       | 832    | 6,727 |
| Avg 79-83 | 1,259                       | 220    | 449   | 561                     | 64     | 186   | 3,326                            | 240    | 1,033 | 5,146                       | 524    | 1,668 |
| Avg 84-88 | 2,090                       | 354    | 1,237 | 1,362                   | 101    | 803   | 4,277                            | 348    | 2,365 | 7,729                       | 803    | 4,405 |

<sup>a</sup>Harvest is in tons, effort is the number of fishermen making at least one delivery, and value is the amount paid to fishermen in thousands of dollars. Note that effort is recorded by fishing district and then summed to estimate area and regional totals. Therefore, an individual making deliveries in more than one district would be counted more than once in the effort calculation.

<sup>b</sup>Port Clarence harvest, effort, and value are included in Norton Sound Area for 1987 and 1988.

Table 8. Red king crab summer commercial harvest, effort, and ex-vessel value in the Arctic-Yukon-Kuskokwim Region, 1977-88.

| Year      | Norton Sound Area <sup>a</sup> |        |       |
|-----------|--------------------------------|--------|-------|
|           | Harvest                        | Effort | Value |
| 1977      | 520                            | 7      | 229   |
| 1978      | 2,090                          | 8      | 1,897 |
| 1979      | 2,930                          | 34     | 1,878 |
| 1980      | 1,190                          | 9      | 890   |
| 1981      | 1,380                          | 36     | 1,172 |
| 1982      | 230                            | 11     | 405   |
| 1983      | 370                            | 23     | 537   |
| 1984      | 390                            | 8      | 395   |
| 1985      | 430                            | 6      | 427   |
| 1986      | 480                            | 3      | 600   |
| 1987      | 330                            | 9      | 491   |
| 1988      | 237                            | 2      | 353   |
| Avg 79-83 | 1,220                          | 23     | 976   |
| Avg 84-88 | 373                            | 6      | 453   |

<sup>a</sup>Harvest is in thousands of pounds, effort is the number of vessels participating in the fishery, and value is the price paid to fishermen in thousands of dollars. Red king crab commercial harvest in the Arctic-Yukon-Kuskokwim Region occurs only in the Norton Sound Area.

Table 9. Ranking of salmon, herring, and crab commercial fisheries in the Arctic-Yukon-Kuskokwim Region based upon average annual ex-vessel value for the period 1984-88.

| Rank | Area         | Species                  | Value <sup>a</sup> |
|------|--------------|--------------------------|--------------------|
| 1    | Yukon        | Chinook Salmon           | 4,475              |
| 2    | Kuskokwim    | Coho Salmon              | 3,180              |
| 3    | Yukon        | Chum Salmon <sup>b</sup> | 3,137              |
| 4    | Norton Sound | Herring                  | 2,365              |
| 5    | Kotzebue     | Chum Salmon              | 1,463              |
| 6    | Kuskokwim    | Chum Salmon              | 1,398              |
| 7    | Kuskokwim    | Herring                  | 1,237              |
| 8    | Kuskokwim    | Chinook Salmon           | 1,011              |
| 9    | Kuskokwim    | Sockeye                  | 946                |
| 10   | Yukon        | Herring                  | 803                |
| 11   | Norton Sound | Red King Crab            | 453                |
| 12   | Yukon        | Coho Salmon              | 291                |
| 13   | Norton Sound | Chum Salmon              | 270                |
| 14   | Norton Sound | Chinook Salmon           | 203                |
| 15   | Norton Sound | Coho Salmon              | 173                |

<sup>a</sup>Value is the price paid to fishermen in thousands of dollars. Only those fisheries with an average value greater than \$100,000 were included.

<sup>b</sup>Yukon chum salmon fishery includes summer and fall run, and both fish sold in the round and roe sales.

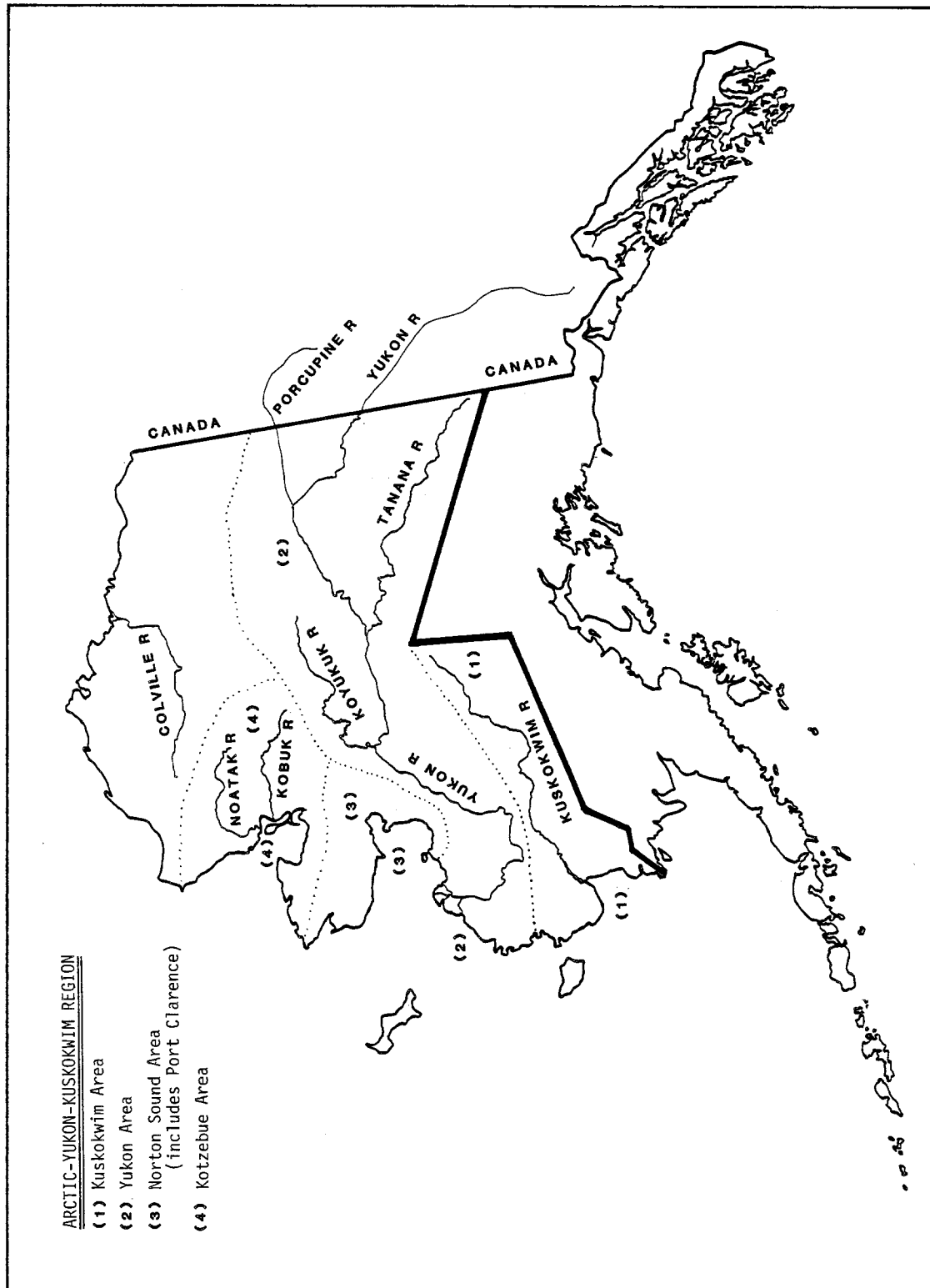


Figure 1. Map of the Arctic-Yukon-Kuskokwim Region.

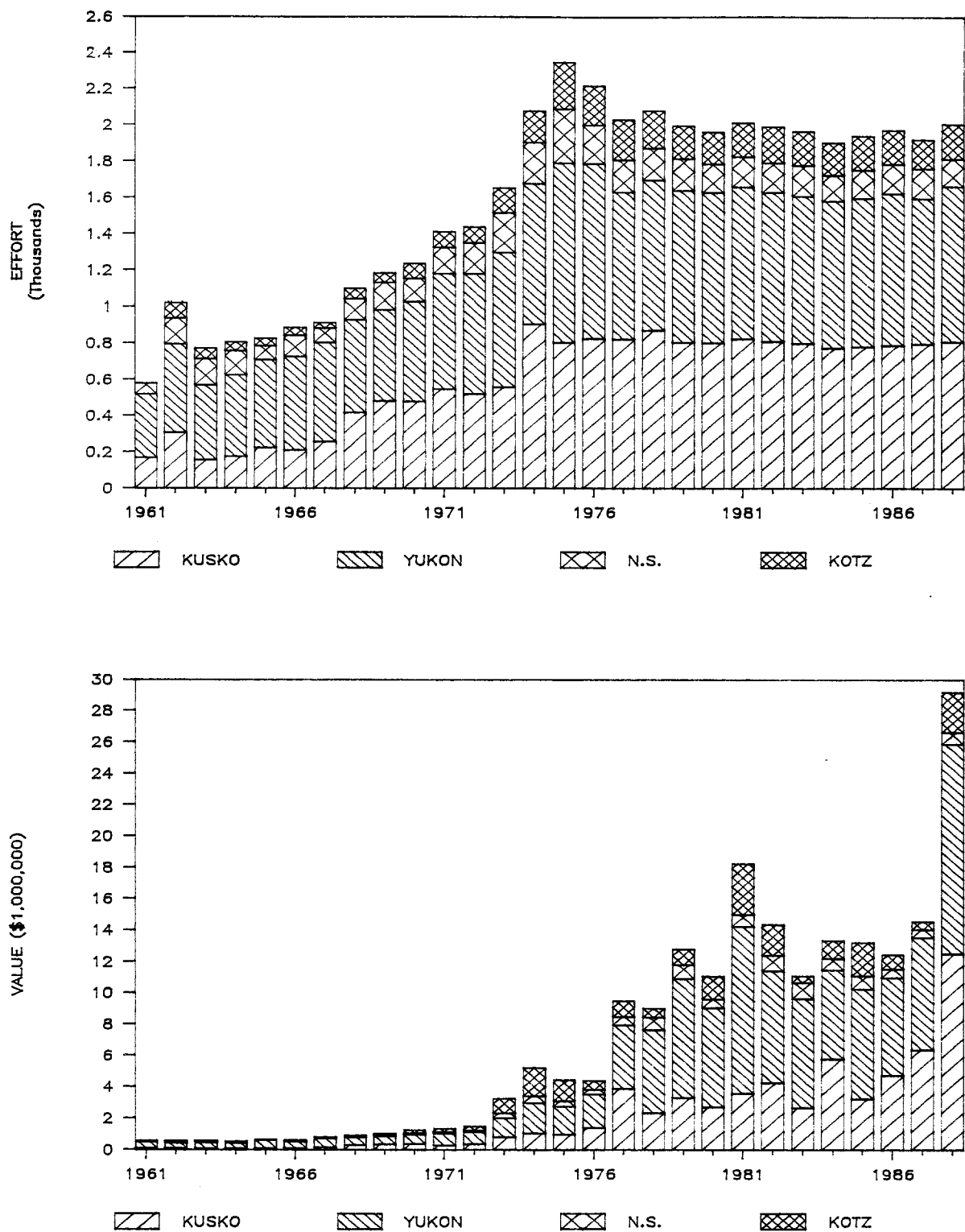


Figure 2. Salmon commercial effort (top) and ex-vessel value (bottom) by area in the Arctic-Yukon-Kuskokwim Region, 1961-88.

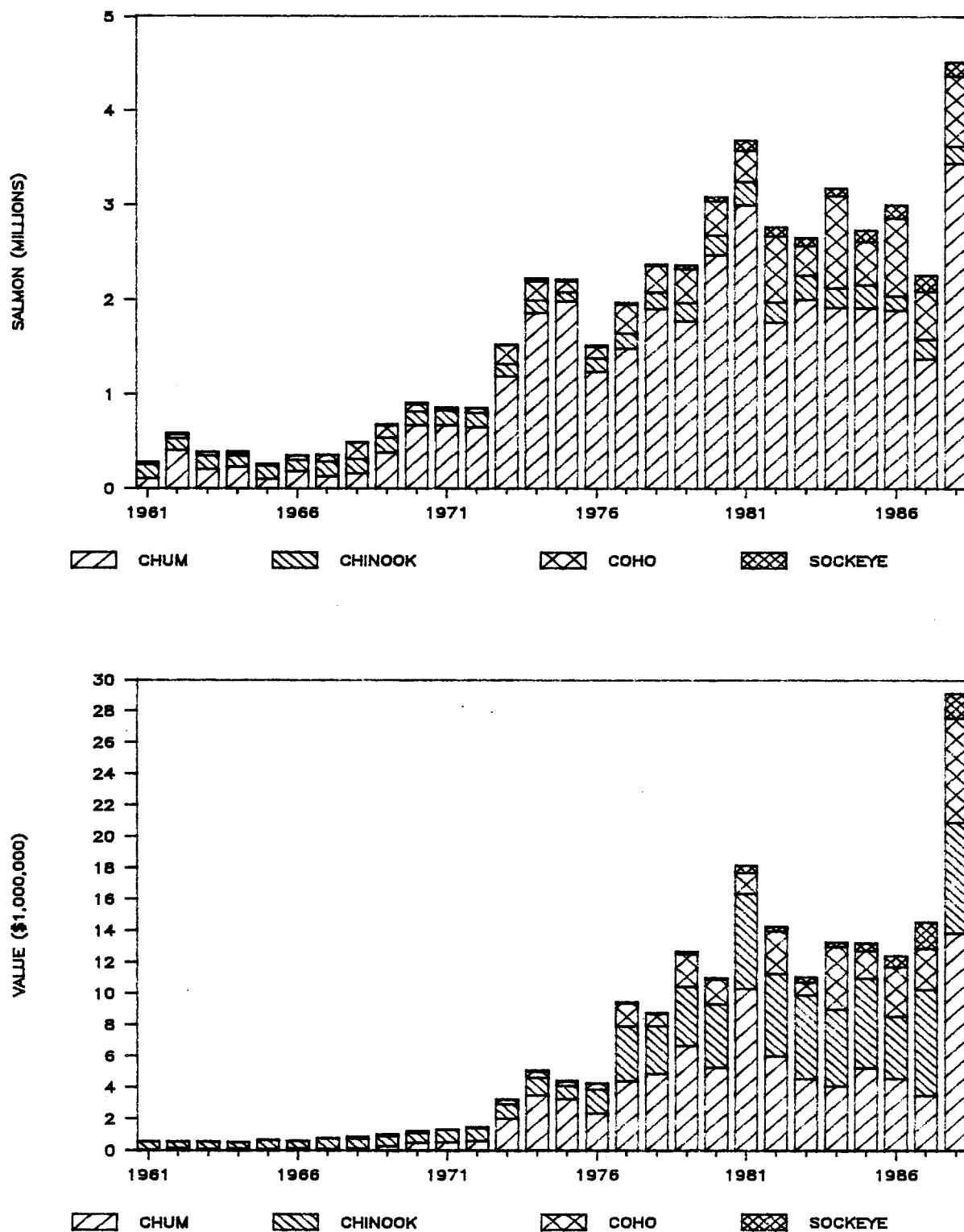


Figure 3. Salmon commercial harvest (top) and ex-vessel value (bottom) by species in the Arctic-Yukon-Kuskokwim Region, 1961-88. Note that roe harvest in 1b is included with numbers of chum salmon, and that pink salmon are too few to appear graphically.



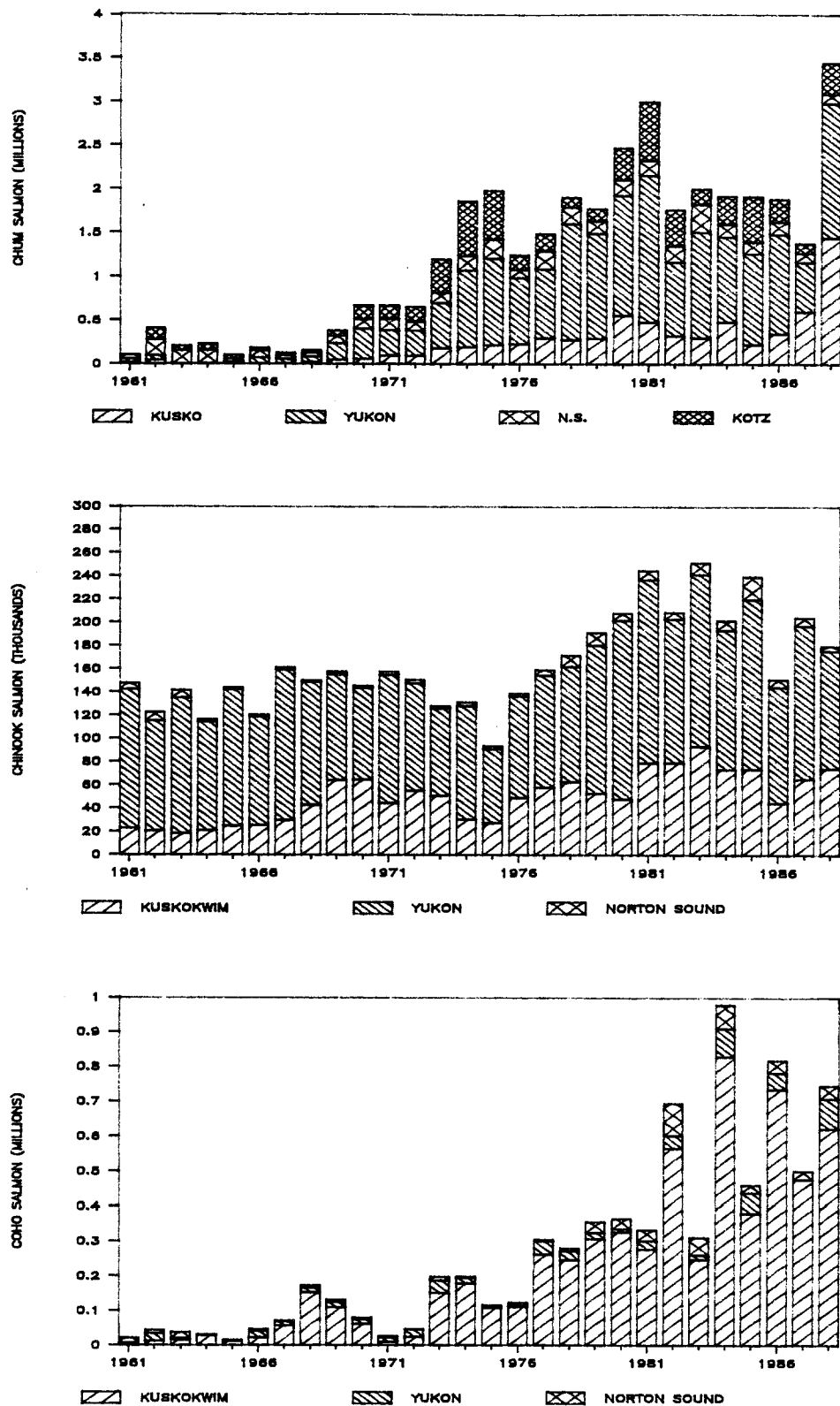


Figure 4. Chum salmon (top), chinook salmon (middle), and coho salmon (bottom) commercial harvest by area in the Arctic-Yukon-Kuskokwim Region, 1961-88. Note that roe harvest in lb is included with numbers of chum salmon.

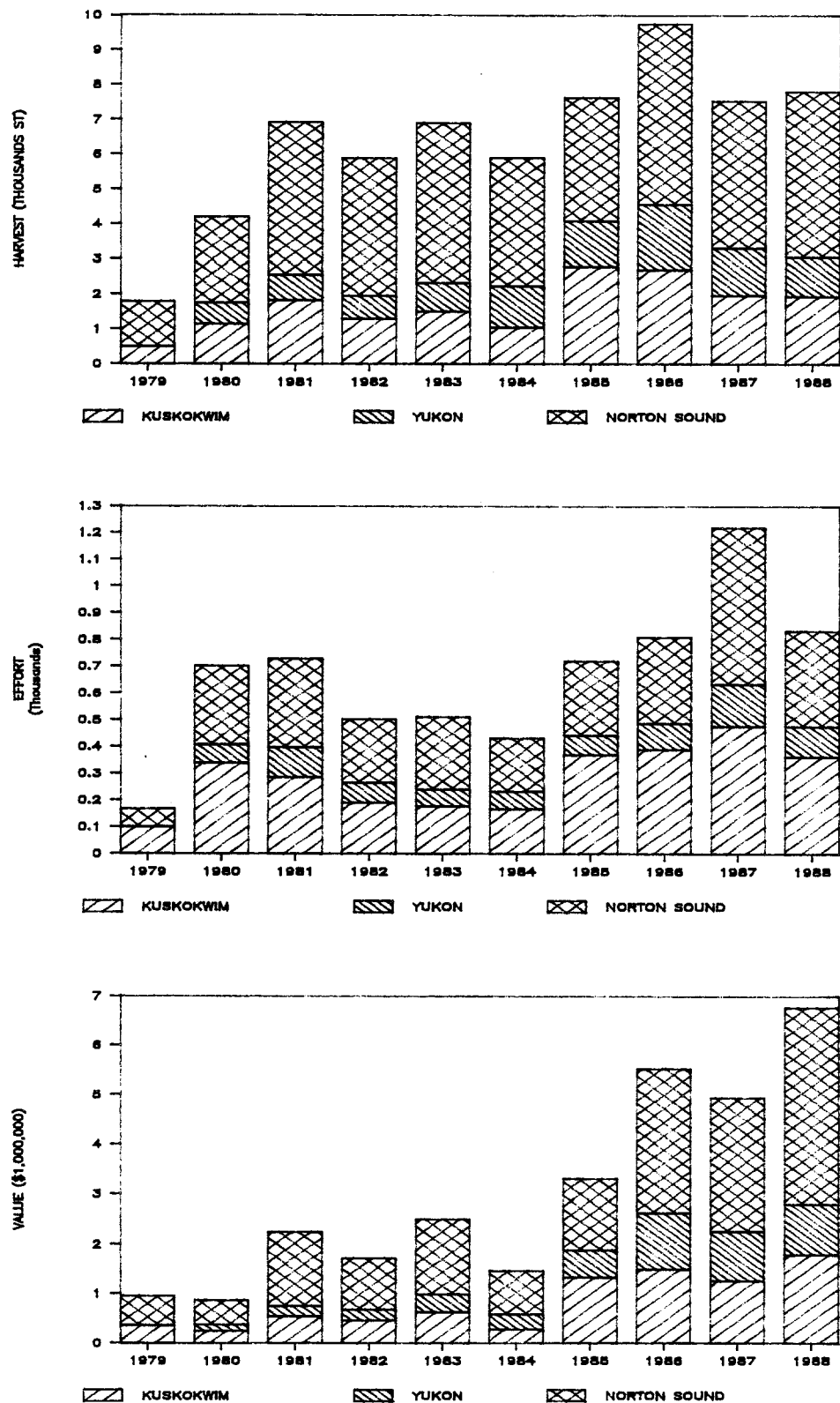


Figure 5. Herring commercial harvest (top), effort (middle) and ex-vessel value (bottom) by area in the Arctic-Yukon-Kuskokwim Region, 1979-88.

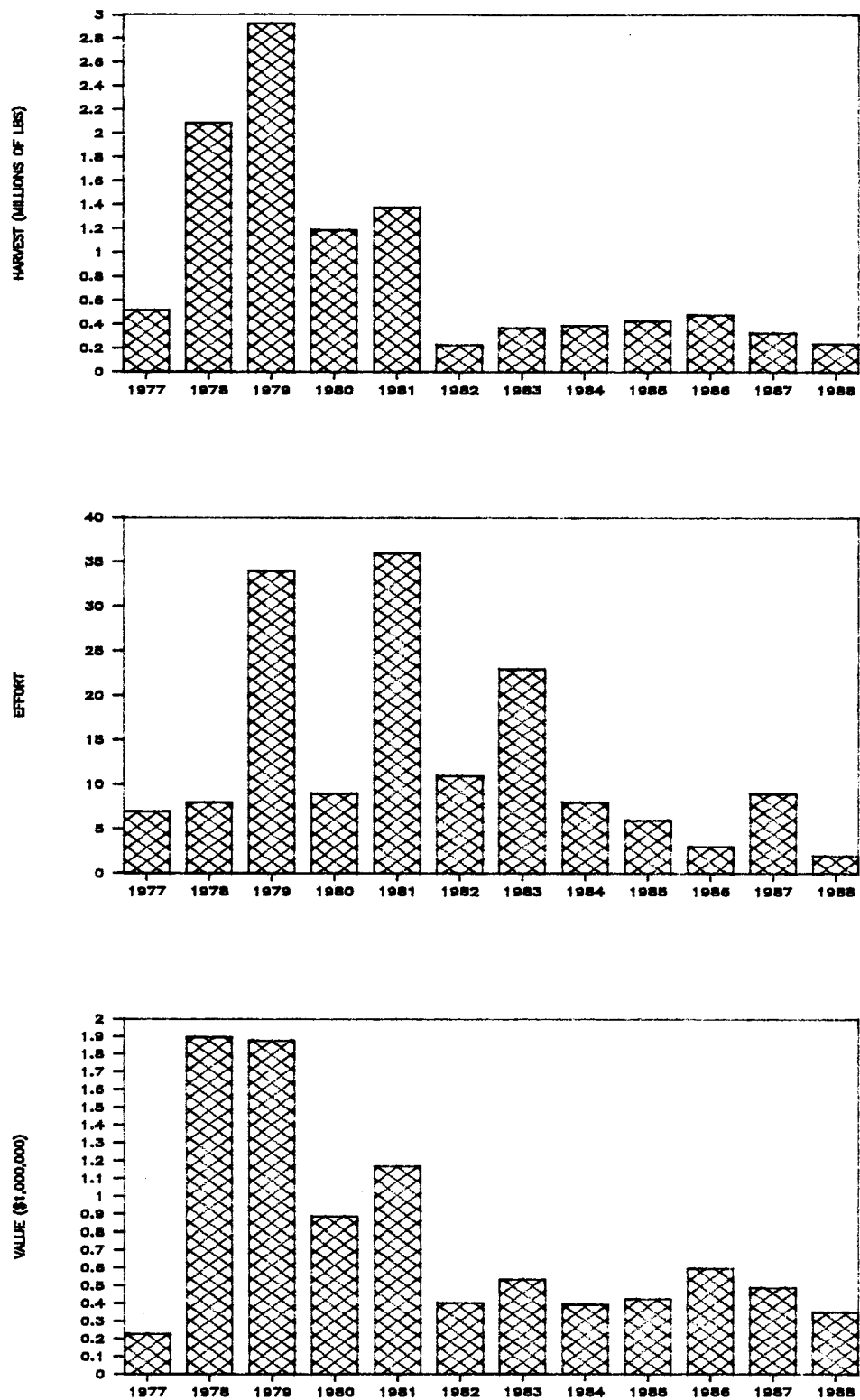
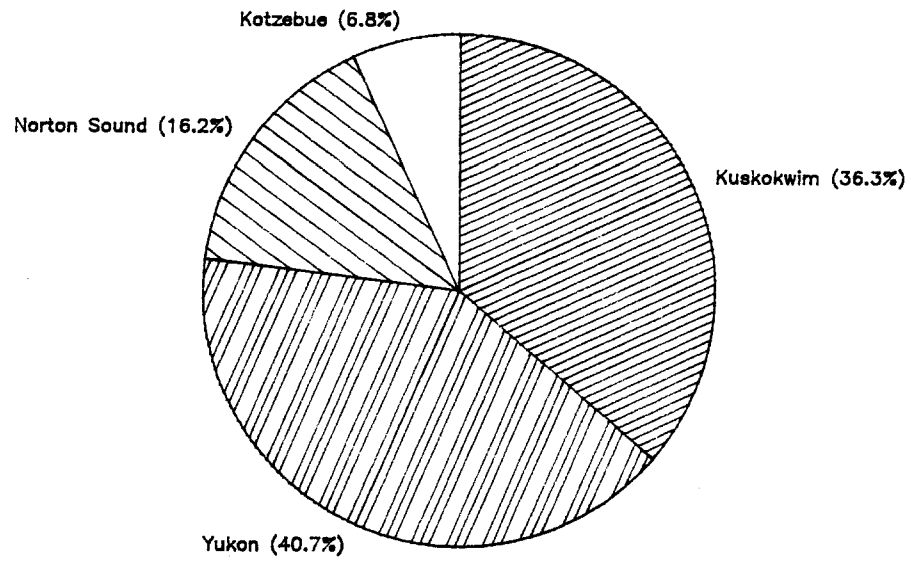


Figure 6. Red king crab summer commercial harvest (top), effort (middle), and ex-vessel value (bottom) in the Norton Sound Area of the Arctic-Yukon-Kuskokwim Region, 1977-88.

BY AREA FOR COMBINED SPECIES



BY SPECIES FOR COMBINED AREAS

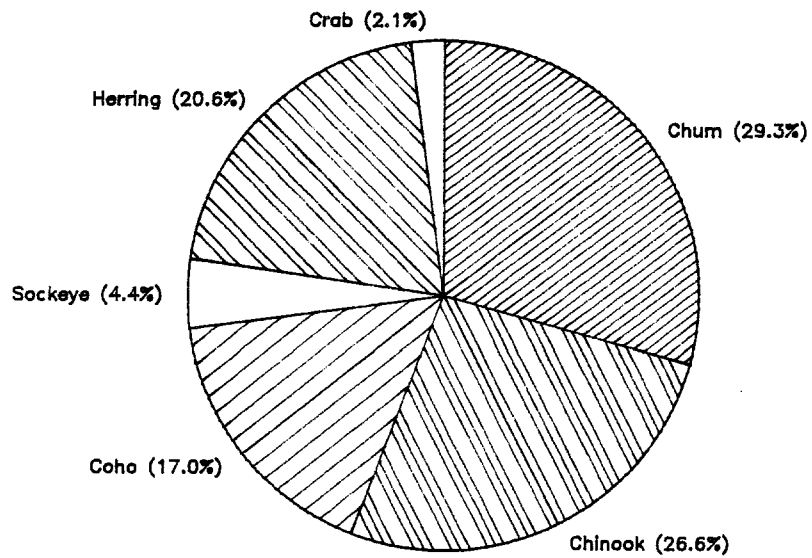


Figure 7. Contribution by area (top) and species (bottom) to the \$21.4 million average annual ex-vessel value of commercial fisheries for the 1984-88 period in the Arctic-Yukon-Kuskokwim Region.

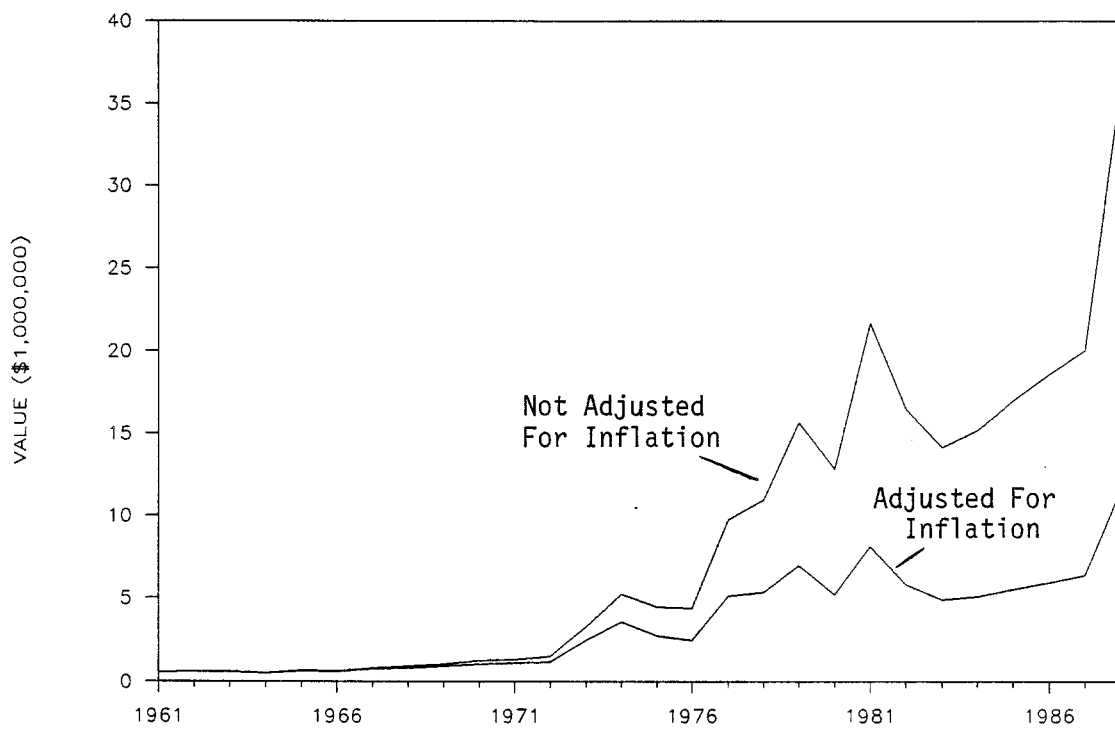


Figure 8. Ex-vessel value in actual dollars and inflation-adjusted dollars (using the Anchorage Consumer Price Index relative to 1961) for salmon, herring, and red king crab commercial fisheries combined in the Arctic-Yukon-Kuskokwim Region, 1961-88.



---

Because the Alaska Department of Fish and Game receives federal funding, all of its public programs and activities are operated free from discrimination on the basis of race, religion, color, national origin, age, sex, or handicap. Any person who believes he or she has been discriminated against should write to:

O.E.O.  
U.S. Department of the Interior  
Washington, D.C. 20240

---